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ScienceDirect

Procedia - Social and Behavioral Sciences 147 (2014) 229 – 236

Procedia
Social and Behavioral Sciences

ICININFO

Social Media Technologies for Achieving Knowledge Management Amongst Older Adult Communities

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Abstract

Social media technologies have a number of characteristics that may suit information access and informal knowledge management by older adults, and there is a rapid uptake of these technologies by this demographic. Based on the characteristics of social media technologies and previous findings of online knowledge management, we introduce a novel framework for achieving social media-based knowledge management suited to older adult communities. The framework involves several key aspects and requirements: public peer-to-peer sharing of information, evaluation of content amongst peers, the "push" nature of these technologies, ease-of-use through simple interfaces, affordability, platforms that are extensible to support a wide range of information types, a self-organizing information dissemination network, and a human-based peer trust network. We conducted a six-month trial of 150 participants using Facebook, Twitter and Skype to determine their perceptions and preferences in relation to using these social technologies. We found that in the majority, the views of the older adult participants were well matched to the requirements for achieving social media-based knowledge management, identified in the framework. In addition, we discuss the implications of the findings for the implementation of future social media-based knowledge management systems.

Selection and peer-review under responsibility of the 3rd International Conference on Integrated Information.

Keywords: social media; knowledge management; older adults; online information

1. Introduction

Since the recent introduction of social media technologies, there has been a widespread uptake and adoption by users worldwide. Two of the most popular systems, Facebook and Twitter, have approximately 1.1 billion and 200-

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Selection and peer-review under responsibility of the 3rd International Conference on Integrated Information.
doi:10.1016/j.sbspro.2014.07.165

300 million active users respectively. Not only are these social technologies effective in providing a more immediate form of communication with others (i.e. acquaintances, friends, family), they have also been seen as a new and efficient medium to retrieve, share and disseminate information. This is due to the unique characteristics and capabilities presented by these systems that have not previously been seen in other forms of Web-based communication: direct and public peer-to-peer sharing of information, the "push" nature of such systems, the ability to gather a large amount of up-to-the-minute information on specific topics of interest from various sources, content evaluation amongst peers, and the formation of self-organizing information dissemination networks – to name a few.

It has been found that there is a plethora of available and relevant online information that can provide consumers with the knowledge and tools to understand and manage certain health conditions and illnesses. Whilst social technology systems have widespread adoption by different users and demographics, it is only recently that there is a trend of rapid uptake of these technologies also by older adults (Zickuhr & Madden, 2012). Due to the developed world's ageing population, there is consequently an increased incidence and prevalence of age-related conditions and illnesses. Many of these age-related conditions (i.e. cardiovascular disease, dementia, osteoporosis) have relevant information in terms of lifestyle and other health-related information that can be found through the Internet. This presents an opportunity to achieve online health knowledge management amongst older adult communities, and in turn decrease the extent of the future burden on the health sector around the globe.

The purpose of this paper is to introduce a novel framework in relation to how older adults can achieve informal knowledge management through the use of social media technologies. The framework will draw upon previous findings of online knowledge management as well as incorporate the identified characteristics of social media technologies and older adult user requirements as mentioned. In addition, we will identify and analyze the perceptions and preferences of a trial of 150 older adult participants using social media technologies, and describe the match of these results to the suggested framework.

2. Related work

Knowledge management of health information, especially in Web-based media, has not yet been fully explored. It has previously been most commonly studied how knowledge management is associated with the various processes and strategies of generating, storing, transferring, applying and protecting knowledge from an organizational perspective (Shultze & Leidner, 2002). However with the introduction of social media technologies, this perspective may shift more from the organization to individuals. These technologies facilitate the emergence of an increasingly complex and interconnected system within which individuals are able to operate, which can be referred to as a knowledge ecosystem (Hemsley & Mason, 2013). The significance of introducing individuals as new entities consequently leads to changes in traditional knowledge management processes, especially when considering the differences in roles and needs of consumers compared to organizations in the area of health.

3. Social media-based knowledge management framework

The framework we introduce is based on several key aspects and requirements that incorporate traditional aspects of knowledge management, however applying them to characteristics and capabilities of modern social media technologies. In addition, we identified from previous research the traits and needs of computer and Internet-using older adults (for both health and broader knowledge management purposes), and these were also encompassed within the framework. The several key aspects that this framework involves are thus considered under two types of characteristics: system capabilities and older adult user requirements. The identified system capabilities are: 1) public peer-to-peer sharing of information, 2) evaluation of content amongst peers, 3) the "push" nature of these technologies, 4) platforms that are extensible to support a wide range of information types and 5) self-organizing information dissemination networks. The identified older adult user requirements are: 1) affordability, 2) a human-based peer trust network and 3) ease-of-use through simple interfaces.

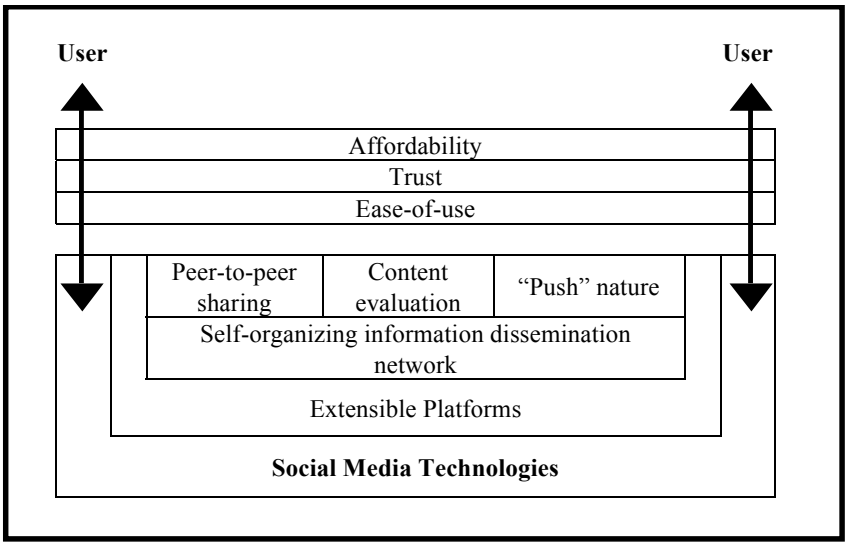

Fig. 1. System capabilities and older adult user requirements within a social media-based knowledge management framework.

4. System capabilities

4.1. Public peer-to-peer sharing of information

Social media technologies provide an open platform in which peers can share information (of varying topics) with other peers. Where social media differs from previous communication methods (e.g. phone calls, email) is the capability for individuals to publicly connect with, and thus share information with, greater numbers. The public sharing of information from an individual can lead to this information being viewed and shared by the individual's 'audience', and further indirect contacts. For example, it has previously been found through the micro-blogging service Twitter that once 'tweets' of trending topics are 'retweeted', they are 'retweeted' almost immediately, thus leading to the fast diffusion of information via this social media technology (Kwak, Lee, Park & Moon, 2010). This increased rate of dissemination allows for a potential plethora of relevant health information to be directed to older adult communities, and indeed for this information to propagate far amongst older adult communities.

The ability to publicly share Web links and large files, such as video and audio, in such an immediate and organized way also provides further benefits for older adults who may have various age-related barriers. One of these barriers is a lower level of health literacy amongst older adult communities, which has been found to lead to increased mortality rates when compared to others with higher health literacy (Rosso, Taylor, Tabb & Michael, 2013). Previous research has discovered that audiovisual information alongside text can enhance health information recall (Bol et al., 2013) as well as assist in the comprehension of health information (Morrow et al., 2012). The capability of public and immediate mass multimedia sharing via social technologies can be advantageous for older adults with lower health literacy to both access and process this information more effectively. In addition, the public peer-to-peer sharing of information may potentially facilitate participation from other consumers and individuals, as well as provide support for certain health-related conditions (Wright & Bell, 2003).

4.2. Evaluation of content amongst peers

One of the most differentiating characteristics that social media technologies bring to traditional health knowledge management is the presence and interaction of individuals who have different needs and requirements. As previously identified, the public peer-to-peer sharing of information can involve various users disseminating information. This presents an interesting implication of content evaluation amongst peers, where certain users may

effectively pass judgment on a piece of health information via selectively deciding whether it has sufficient value to pass along to other people they are connected with (Steele & Dumbrell, 2012). The viewing, downloading, and saving/storing of health information by older adults are also important actions that should be emphasized in this framework, as they are important quantitative measures that can be used to assess the type of information being successfully communicated and provide this feedback (i.e. number of 'likes', 'retweets', 'times downloaded', 'audience characteristics') to sources of this information (e.g. health organizations). Thus, evaluation of content amongst peers not only assists in relevant information being filtered to older adult communities, it can also allow health information sources to determine the most effective ways to communicate their messages.

4.3. The "push" nature of these technologies

Social media systems are driven by a style of Internet-based communication that can be called "push" technology, where information is delivered/sent to the client without the user having to make a specific request. This is an extremely beneficial method of information delivery in relation to older adult communities, as in addition to having lower levels of health literacy; there are also various issues with this age group for information retrieval from the Internet. For example, older adults have been found to use insufficient search queries and misunderstand different Web browser search tools when attempting to look for relevant health information (Huang, Hansen & Xie, 2012). Factors such as socio-demographic characteristics and the type of health information being searched for also determine the seeking behaviors of users, and subsequently the quality of Web documents retrieved (Rutten et al., 2012). In addition, large search engines (e.g. Google, Yahoo!) have been seen to present the consumer with Web site ranking discrepancies and content emphasis variability during searches for health information (Wang et al., 2012).

The use of "push" technology would allow older adults to customize the relevance and type of information being transferred to them. By subscribing (i.e. 'following' on Twitter, or 'liking' on Facebook) to well-known, trusted and reputable health organizations and entities, older adults are able to receive information relevant to their needs streamed to them without having to retrieve information themselves. Previous studies have shown that the flow of information from health organizations and hospitals (Huang & Dunbar, 2013) is predominantly one-way (i.e. sent out instead of interacting with consumers on these social technology sites). This method overcomes the barriers previously stated, and allows for the effective filtering and management of the information flowing to the individual.

4.4. Platforms that are extensible to support a wide range of information types

Social media technologies have been seen to contain a plethora of information, covering a large variety of topic areas. It has been identified previously that there is not only a large amount of quality health information on these platforms, but also an extensive range of condition-specific categories that this information falls under (Dumbrell & Steele, 2013). When taking into account the target audience of older adult communities, the type of relevant health information available on these social media technologies as well as the potential for positive health behavior changes is quite well matched. For example, older adults have a higher prevalence of chronic illness than their younger counterparts and it has been previously found that those with chronic condition were approximately twice as likely to consult online rankings/reviews of doctors, hospitals, and available treatments on social networking sites (Thackery, Crookston & West, 2013). There have also been reported benefits of chronic condition management through these social media technologies, with research on diabetes management on Facebook finding different users utilizing these technologies for various reasons, such as sharing personal clinical information, requesting guidance and feedback for management of the disease as well as receiving emotional support (Greene, Choudhry, Kilabuk & Shrank, 2011). Therefore social media technologies not only provide different types of condition-related information, but also different forms of information interaction that are relevant to the individual's needs. In addition (as discussed in Section 3.1) these technologies support via embedded links a large variety of types of multimedia. This also acts to make these platforms highly extensible for future knowledge management use.

4.5. Self-organizing information dissemination networks

As discussed in this novel knowledge management framework, older adults are able to share and evaluate relevant health content through these open platforms of social media technologies. The various interactions of the entities (i.e. health consumers and providers) within this knowledge ecosystem created by these social media technologies can potentially create what has been referred to as a self-organizing information dissemination network (Steele & Dumbrell, 2012). This is a process that incorporates the various system capabilities listed above, where: 1) older adult users selectively choose health information sources customized to their health consumer needs; 2) these health information sources create and/or "push" relevant information to these users; 3) the users receiving this information evaluate this information and decide whether or not to pass-along or share this with other peers; 4) these peers receive this information being pushed towards them and may also perform similar actions on this information as well as refer back to the original source (if they are not already subscribed); and 5) health information sources receive feedback on the health information they have pushed out (e.g. characteristics of successfully disseminated information, information type with regards to health-area and delivery). This is a simplified view of a much larger and more complex level of interaction, however it shows that the various system capabilities of social media-based technologies support this modern flow of health information and informal knowledge management.

5. Older adult user requirements

5.1. Affordability

Social media systems are typically free to use, once an individual has a device with Internet access. This low financial barrier is also important when it comes to older adult use of such systems. There have been found to be cost-related barriers amongst various key groups that affect adoption of certain technologies required to access social media systems (i.e. computers, the Internet) and thus affecting access to digital health information. It has previously been identified that a majority of users 60 and over had reported issues with Internet and computer affordability leading to discontinued use (Choi & DiNitto, 2013). In addition, older adult communities in less developed countries and those with lower socioeconomic status (Anderson, Richardson, Noelle & Harootyan, 2013) were also found as factors that contributed to the further exclusion of this age-group from accessing the Internet. With the increased free access to these technologies due to government and council initiatives (i.e. public libraries, senior centers, recycled desktops/laptops), as well as findings that using computers for ageing-related cognitive interventions are cost-effective (Kueider, Parisi, Gross & Rebok, 2012), these technologies may present themselves as affordable to certain older adult communities.

5.2. Human-based peer trust network

One important aspect for older adult users is the trust that is required: both in the social technologies they are using as well as in relation to the entities they are connecting and communicating with. There have always been varying levels of mistrust experienced by older adults when using search engines like Google, Yahoo, as well as health-related Web sites (Gatto & Tak, 2008). This mistrust can lead to various privacy concerns, which is also a significant issue with various other online users (not just older adults) and the access and sharing of digital health information (Fink & Beck, 2013; Park, 2013). These privacy issues cause many older adults to avoid activities on the Internet that involve personal information, as well as to question the trustworthiness of retrieved information from these sites. This presents a potential problem, as whilst there are many significant potential benefits that result from the use of health-related Web sites and social media, there are also further trust issues that must be explored that possibly affect older adults using these technologies.

Trust between the consumer and entities they are sharing, evaluating or retrieving information from is also an important aspect within this framework. With regards to social media-based marketing, peer communication has been seen to not only affect product attitude and thus purchase intentions, but also the tie strength amongst peers

(and identification with peer groups) has been seen to positively affect peer communication (Wang, Yu & Wei, 2012). Also due to the increasing commonality of shared patient experiences on the Internet, consumers have become wary of recommendations and information being suggested/shared by other consumers or health information sources with the presence of advertisements and commercial overtones (Sillence, Hardy & Briggs, 2013). Therefore it is important for those creating and sharing health information targeted to older adults to understand the underlying trust issues of this age group, and address these trust and privacy concerns to potentially reach more people within this community.

5.3. Ease-of-use through simple interfaces

Social media technologies typically have simple user interfaces. This is an important characteristic in relation to use by older adults and can help to support the use of such systems for knowledge management amongst older adult communities. Older adults require more appropriate interfaces when using computer and Web-based technology than other population groups (i.e. teenagers and younger adults) due to ageing-related issues such as visual, hearing and cognitive impairments. Legibility was outlined as a major issue for older adults (in comparison to their younger counterparts) when using an Internet-based telemedicine system, and interface aspects such as bland graphics, poor color contrast and small/thin letters were identified as main reasons behind this (Chun & Patterson, 2012). The researchers also suggested that proper organization and structure for the massive amount of health-related, Web-based information available would be a big challenge to overcome. Various innovations, such as touchscreen and tablet technologies, have been developed which present simplified interfaces for users to interact with Internet-based resources. These have been seen to have a positive effect on older adults when searching for and retrieving information from the Web (Jayroe & Wolfram, 2013). In addition, social media technologies (e.g. Twitter) are compatible and popularly used on these interfaces (i.e. smartphones, tablets) thus presenting further advantages for older adult communities managing health information through these mobile platforms.

6. Exploratory study: preferences and perceptions of older adults about social technologies

We carried out an exploratory study to examine both system capabilities and older adult user requirements under the framework, with an emphasis being placed particularly on the older adult user requirements.

6.1. Methodology

We conducted a study of 150 older adult participants (55 years and over) and their experiences with using social media technologies. Participants were taught how to use three popular technologies: Facebook, Twitter and Skype, over two training sessions. After these training sessions, participants were given a six-month trial period to use these social media technologies as they chose (i.e. non-compulsory). Questionnaires were administered at the commencement of the research project, with a second questionnaire administered after the conclusion of the six-month trial period. 110 participants completed both questionnaires and thus only their responses were included in the data analysis. Quantitative and qualitative data from pre and post-trial questionnaires were entered into Excel with the quantitative data then analyzed using SPSS.

6.2. Results & discussion

When asked about the relevant “benefits of these social technologies”, 77% of respondents answered they used these social media technologies to find information. This is an interesting characteristic as it shows that a significant proportion of the sample was using these technologies for information retrieval as they may have recognized the plethora of information available on such platforms. Many older adults also noted that a benefit of social technologies was to share information (65%), and saw social technologies as a way of communicating with larger audiences that are, in a way, ‘listening’ to them. These findings reinforce not only how this older adult user

group saw the benefits in using social media technologies for information interaction, but also the potential for this novel use for informal health knowledge management due to these specific system capabilities.

Nearly 90% of respondents in the sample either agreed or strongly agreed that the social media technologies were affordable to use. This may have been due to a combination of a few factors, namely these social media technologies being free to sign up to and use, as well as the finding that 94% of respondents stating that they already had Internet access at their place of residence (with the minority 6% still being able to access free Internet in public places such as libraries and senior homes). Although this may have been an expected result, it is also very promising with regards to previous literature, which has found older adults as having greater affordability concerns (see Section 5.1). Hence the reason for our older adult sample finding social media to be affordable can possibly be explained by many of them already having access to working computers and the Internet, which are the largest cost barriers to the use of these technologies. Future studies may examine the cost-effectiveness of social media technologies specifically in less developed areas or lower socio-economic groups.

63% of respondents agreed or strongly agreed that these social media technologies were easy to use. This result may have been attributed to various factors, such as the overall interface design and function of these social media technologies themselves. This result is also quite encouraging considering over half of the older adult participants classified themselves as having "average" computer proficiency and about one-fifth of the sample stating they had "limited" or "very limited" skills in computer usage abilities. In addition, whilst the terms used (i.e. "average", "limited") were self-assessed and self-reported, this finding is positive in identifying that although nearly 80% of this sample ranked themselves as having "average" computer proficiency or below, a majority still found social media technologies easy to use. There was also a weak correlation (ρ=0.208) between computer proficiency and the perceived ease of use of social networking sites; suggesting that computer proficiency did not strongly relate to post-trial perceptions on ease of use of these social media technologies in our study.

A majority of participants (62%) stated that they felt their privacy to be adequately protected, with many being previously unfamiliar with, or had heard negative news/press reports, about these technologies. It was also found that through education in relation to the settings and functions of each social media technology, participants did gain a greater understanding of the control they had over the type of connections they could make and the communication they could have. In addition, although privacy was seen as a key issue during the training and trial period, it seemed that if older adult users concluded that the platform would meet their needs then privacy became less of an issue. For example, although Facebook was considered the second most secure in terms of privacy, it was the most used application during the six-month trial period as many respondents saw benefits through its use.

In addition to these results, a large majority of participants (79.1%) said that they would continue using these technologies after the conclusion of the research trial. This shows a promising intention toward long-term use of these technologies, and the potential benefits in information and knowledge management-related areas (not only health) within older adult communities.

7. Conclusion

The purpose of this paper was to present an informal knowledge management framework based on the system capabilities present in social media technologies as well as the requirements of older adult users. The system capabilities distinctive to social media technologies are: public peer-to-peer sharing, content evaluation amongst peers, and the "push" nature of these systems. A self-organizing dissemination network incorporates these three aspects, which is a characteristic of the social media platform, which also has the characteristic of being extensible enough to support a wide range of information types. However, factors such as affordability, human-based peer trust and ease-of-use of these technologies also affect utilization by older adults. Participant responses in an exploratory study were promising, and well matched the informal knowledge management framework requirements for older adult users. There is significant potential for social-media technologies to assist with the management of information, including health information and hence health amongst older adult communities.

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